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QUESTIONS AND ANSWERS ABOUT SCREWWORM ERADICATION

What is the screwworm? The screwworm is an injurious external parasite of livestock and other warmblooded animals, including pets, and even human beings. It is the maggot or larva of the screwworm fly with the Latin name, Cochliomyia hominivorax. It is called "screwworm" because the taper of the larva's body and the rings or spines that encircle it somewhat resemble a wood screw. It is very difficult to distinguish from other blowfly maggots.

What does the screwworm fly look like? It is about twice the size of a housefly. It has a bluish-green body with three dark stripes along the back and an orange-colored head. The fly is rarely observed, except around animal wounds, and is difficult to distinguish from other blowflies.

What is the life cycle of the screwworm? The time required for development--from egg, to larva, to fly--averages about 3 weeks. Flies can mate when they are 2 days old, and females mate just one time. At 6 days of age, a female fly can lay about 250 eggs on a wound. Individual females on rare occasions, can lay up to 3,000 eggs--usually in clusters of 250 to 400--at 4-day intervals. Tiny, barely visible larvae hatch from the eggs within a day. The larvae bury themselves almost full-length in the animal's wound and feed on flesh for 5 to 6 days. They are then full-grown and about ½-inch long. They then drop to the ground and enter the soil, where they are transformed into pupae encased in dark-colored, tough capsules. During warm weather, flies emerge from the pupal cases in about a week. In colder weather, they may not emerge for as long as 60 days.

Prepared by
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Damage Caused by Screwworms

What is the effect of a screwworm attack on animals? The result usually is death when screwworm-infested wounds are not treated. Animals may be maimed or stunted, make slow weight gains, and be more susceptible to diseases.

What attracts the fly to animals? Flies are attracted to wounds such as navels of newborn animals, wire cuts, scratches, snags, surgical operations, brands, dog bites, fly and tick bites, wounds from fighting, punctures in the udders of sows and faces of new-born pigs made by the needlelike teeth of suckling pigs, earmarking, eartagging, ringing of hogs, and gunshot wounds. Navels of newborn animals appear to be the most attractive to the fly, and navel infestations are more likely to cause death than the others listed. Infested wounds are even more attractive to screwworm flies than fresh wounds.

How does weather affect screwworm? Extreme high or low temperatures, rainfall and drought for prolonged periods are unfavorable for the development of screwworms. Following a warm winter when conditions are favorable for screwworm activity, animal losses are usually heavier and extend over a much greater area than those following a cold winter.

Where Screwworms Occur and How They Spread

Where do screwworms occur? Screwworms are native to the southwestern United States. They also exist in Mexico, Central America, South America, and in certain islands of the West Indies. The screwworm was accidentally brought into the Southeast in 1933. This reservoir of infestation was eliminated in 1959 by destroying the overwintering population. Screwworms spread seasonally to other States from Texas, New Mexico, Arizona, and California. Infestations are heaviest from the Rocky Mountains to the Mississippi River. States as far north as Minnesota and New Jersey may have infestations. Limited numbers of screwworms resulting from movements of infested animals from the Southwest have continued to appear annually east of the Mississippi River. These have been quickly detected by livestock owners and eliminated.

How do screwworms spread? They are spread as a result of the transporting of screwworm-infested animals or by screwworm flies ranging outward from infested areas. Hobbyists, insect collectors, and even scientists carrying out research projects on insects may unwittingly spread the pest if they transport live, fertile specimens into screwworm-free areas.

Are there fluctuations in the size of the area where screwworms survive the winter? Fluctuations in winter climatic conditions cause fluctuations in the size of screwworm overwintering areas, which occur in the southern tier of States in the eradication area. The areas are larger during mild winters than during severe winters.

How many hosts do screwworms have? Any warmblooded animal is a potential host for screwworms. No county in the eradication area has fewer than 20 screwworm hosts, such as livestock and wildlife, per square mile. Some counties have hundreds.

What keeps screwworms from moving freely from the Southwest to the Southeast? At Federal inspection stations along the eastern borders of Arkansas and Louisiana, animals entering the Southeast are inspected for screwworms and treated with pesticide. Livestock officials in Florida, Mississippi, Alabama, Tennessee, South Carolina, and Georgia assist Federal inspectors by reinspecting animals at their destination. In addition, officials in Louisiana and Arkansas are checking animals purchased out of State as they arrive at farms and ranches. Only scattered and relatively light screwworm infestations may occur during the late summer in areas bordering the screwworm-free Southeast. This greatly reduces the possibility of infestation as a result of flights of screwworm flies into the free areas.

Is there a natural barrier between Mexico and the United States? A natural barrier, such as a very high mountain range or wide expanse of water, does not exist in northern Mexico to prevent screwworm flies from migrating into the United States. Screwworms are present throughout the year along the Rio Grande River, and the river is not a barrier to flights of the pest into the United States. Thus, the problem of maintaining screwworm-free U.S. areas adjacent to the U.S.-Mexico border differs substantially from that encountered in operating the protective system along the Mississippi River Valley.

The Southwest Screwworm Eradication Program

When did the eradication program begin? The release of limited quantities of sterile screwworm flies was begun on February 14, 1962, utilizing experimental facilities at Kerrville, Tex.

What is the goal of the eradication program? The immediate goal is eradication of screwworms from Texas, New Mexico, Oklahoma, Arkansas, and Louisiana within a 3-year period, and the development and establishment during that period of measures necessary to prevent reinfestation.

Who is cooperating in the program? The program is a joint effort of USDA's Agricultural Research Service and many public and private groups and organizations in Texas, New Mexico, Oklahoma, Arkansas, and Louisiana. These include the Southwest

Animal Health Research Foundation, the Texas Animal Health Commission and other State livestock regulatory agencies, organized livestock groups, Extension Services, vocational agriculture organizations, sportsman groups, and many others. Livestock producers and agricultural officials of the Republic of Mexico have cooperated with USDA since 1959 by providing information about screwworms infesting the border area, and are continuing to assist in eradication activities.

What is the estimated cost of the 3-year eradication program? The estimated cost of the program is $12 million. Federal funds will be available in those instances in which local or State sources provide at least 50 percent of the expenses for production, irradiation, and release of sterile screwworm flies.

How does this eradication program differ from other eradication programs? In addition to other important animal disease eradication measures this program involves the use of gamma rays from radioactive cobalt, a product of nuclear research. The rays are used to sexually sterilize millions of screwworm flies reared on ground meat and blood. The sterile flies are then released in large numbers over infested areas. The sterile male flies seek out and mate with natural or native females. These native females mate only once, and after mating with a sterile male, the eggs they lay do not hatch. The reproductive potential of the fly is destroyed. If the releases continue long enough in sufficient numbers, possibilities for the native screwworm population to accomplish fertile matings become more remote and eventually the insect is eradicated. The method was successful in the Southeast.

Will sterile fly release alone eradicate the pest? No. There are five principal measures that must be employed: (1) Detecting and reporting (including submission of suspected maggots) by livestock and pet owners of all suspected screwworm cases in order to provide extensive daily information about the incidence and abundance of the pest; (2) sterile fly release; (3) control of animal movements and related animal inspection and treatment to prevent introduction and spread of screwworms; (4) preventive measures and treatments for infestations, intensively applied by livestock owners; (5) wide circulation of information, to keep livestock producers informed of the progress of the program and of measures they can take to strengthen it.

What is unique about the Southwest screwworm problem? There are no known natural factors that prevent screwworms from moving freely throughout northern Mexico and the southwestern United States. The overwintering area for screwworms in the Southwest is larger than it was in the Southeast. The terrain, vegetation, and climate also differ. It will be necessary to develop an artificial barrier along the U.S.-Mexico border that will involve control of animal movements along with continued release of sterile screwworm flies.

The Sterile Fly Production Plant

Where are the sterile screwworm flies being produced? Headquarters for the eradication program are established at the former Moore Air Base near Mission, Tex., where 50 to 75 million sterile flies can be produced each week. Half of these are males.

How are screwworms reared? Screwworm maggots are reared in a warm mixture of ground lean meat, water, and blood, plus a small amount of preservative. As the larvae mature, they crawl from the mixture and are placed in sawdust where they enter the pupal (cocoonlike) stage. For production of 75 million flies weekly, the following approximate amounts of materials are required each 7-day period: meat, 40 tons; blood, 4,000 to 5,000 gallons; water, 13,000 gallons.

When are the screwworms exposed to the radioactive material for sterlization? This exposure is made $5\frac{1}{2}$ days after they enter the pupal stage.

How long are they exposed? They are exposed for 10 to 15 minutes to gamma rays from Cobalt-60, long enough to receive a dose of approximately 8,000 roentgens.

Will the flies be sterile when they emerge from these pupae? Yes. Males and females are sterile and emerge from the pupae in cardboard release cartons 1 and 2 days after exposure to the gamma rays.

Are the flies then radioactive? Definitely not. No more so than a person who has been X-rayed.

How are the sterile flies distributed over the eradication area? The pupae are packaged in small, cardboard cartons in which the flies emerge. The cartons are dispersed systematically over infested areas by means of aircraft equipped with a special mechanism to open and release them automatically at predetermined intervals.

The Role of Sterile Flies in Eradication

Where are sterile screwworm flies released? They are released over areas where overwintering screwworm populations must be eliminated, where outbreaks threaten to spill over into an area already free of screwworms, and where the artificial barrier zone must be developed and maintained. Heavy fly release rates may be used to control abnormal buildup of the insect and to treat areas where vegetation, terrain, or other factors provide favorable conditions for native screwworms.

At what rate are the sterile screwworm flies released? Flies are released continuously and systematically over large areas at rates of 200 to 1,000 per square mile.

Is it possible sterile flies produced at Mission, Tex., may be used in the Southeast? Yes. Screwworm outbreaks in the Southeast from shipped-in livestock may require the release of sterile flies east of the Mississippi River.

How is the Southwest eradication area protected against reinfestation? Livestock movements into the eradication area from other screwworm-infested areas of the U.S. and Mexico are regulated by use of Federal livestock inspection stations. They are patterned after the inspection stations now operating in the Mississippi River Valley.

At these stations livestock entering fly-free areas of the eradication area are unloaded and checked in a chute for screwworms. Approved insecticides are applied to each animal and all wounds are treated before entry is permitted.

The Barrier Zone

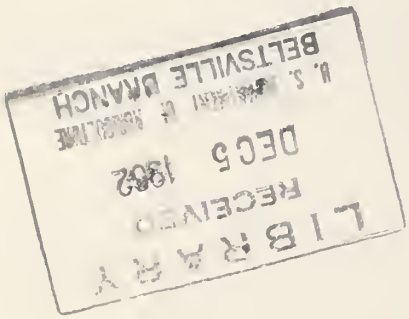
How is the width of the permanent barrier to be determined? Sterile screwworm files are being released in a zone along the U.S.-Mexico border that initially will average about 100 miles in width. The number of flies released and the width and length of the fly-release zone are factors that must be determined as the barrier is developed. Screwworm specimens submitted by U.S. and Mexican livestock producers are helping to determine where and in what quantities sterile flies should be released to establish an effective barrier zone.

Can infested wildlife carry screwworms far into, and perhaps through a barrier zone? Wild animals large enough to support a screwworm infestation until maggots drop out normally do not migrate great distances and would be further inhibited by the damaging effect of the infestation.

Are Mexican livestock inspected before entry into the U.S.? Mexican livestock entering the United States are thoroughly checked and treated for screwworms at the time they are inspected for other diseases and parasites at border stations by the USDA's Animal Inspection and Quarantine Division personnel. USDA operates patrols to prevent animals from straying back and forth across the border.

What Livestock Producers Can Expect and How They Can Assist

Will there be immediate reduction in infestation? It is likely that producers in the eradication area will experience considerable relief from screwworms during the first year of operations. The program plan calls for elimination of all screwworms in the eradication area and the development of a fly-free barrier zone along the international border.

How can livestock producers help? (1) Examine animals regularly for any scratch, cut, or open wound. (2) Manage livestock in a way that prevents injuries and avoids wounds from handling, surgery, birth, or other causes, especially during warm weather when screwworms are abundant. (3) Collect maggots or eggs that may be present in wounds, place them in alcohol or water, and give them to the county agent, livestock inspector, or veterinarian for positive identification. (4) Treat wounds with EQ 335, smear 62, or smear containing ronnel. (5) Apply approved preventive sprays, following directions provided on manufacturer's label. (6) Closely observe restrictions on animal movement. (7) make sure that purchased animals are free from screwworms when they are loaded at point of origin. (8) Cooperate with neighbors; encourage them to follow precautions.

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